

CLAIMS

What is claimed is:

1. A process for manufacturing an integrated circuit package comprising:
mounting a semiconductor die to a first surface of a substrate;
mounting a die adapter to said semiconductor die;
wire bonding said semiconductor die to ones of conductive traces of said substrate;
mounting at least one collapsible spacer to at least one of a heat spreader, said die adapter and said substrate;
placing one of said heat spreader and said substrate in a mold cavity;
releasably clamping the other of said heat spreader and said substrate to a die of said mold cavity, such that said collapsible spacer is disposed between said heat spreader and said substrate;
molding a molding compound in the mold, thereby molding the semiconductor die, the substrate, the wire bonds, said die adapter, said at least one collapsible spacer and said heat spreader into the molding compound to provide a molded package;
forming a ball grid array on a second surface of said substrate, bumps of said ball grid array being electrically connected to said conductive traces; and
singulating said integrated circuit package.
2. The process according to claim 1, wherein said placing one of said heat spreader and said substrate in a mold cavity comprises placing said heat spreader in said mold cavity such that said heat spreader rests on a lower die of said mold.
3. The process according to claim 2, wherein said releasably clamping comprises releasably clamping said substrate to an upper die of said mold.
4. The process according to claim 1, wherein said placing one of said heat spreader and said substrate in a mold cavity comprises placing said substrate in said mold cavity such that said substrate rests on a lower die of said mold.
5. The process according to claim 4, wherein said releasably clamping comprises releasably clamping said heat spreader to an upper die of said mold.

6. The process according to claim 1, wherein said wire bonding further comprises ground wire bonding said semiconductor die to said die adapter.

7. The process according to claim 1, wherein wire bonding further comprises ground wire bonding said semiconductor die to at least one ground pad on said substrate.

8. The process according to claim 1, wherein said mounting at least one collapsible spacer comprises mounting said at least one collapsible spacer to said substrate.

9. The process according to claim 1, wherein said mounting at least one collapsible spacer comprises mounting said at least one collapsible spacer to said heat spreader.

10. The process according to claim 1, wherein said at least one collapsible spacer comprises a plurality of collapsible spacers, and mounting said at least one collapsible spacer comprises mounting one of said plurality of collapsible spacers to said die adapter and mounting at least another of said collapsible spacers to said substrate.

11. The process according to claim 10, wherein said one of said plurality of collapsible spacers is disposed between and in contact with said heat spreader during molding.

12. The process according to claim 10, wherein said at least another of said collapsible spacers is disposed in contact with said heat spreader during molding.

13. A process for manufacturing a plurality of integrated circuit packages comprising:
mounting a plurality of semiconductor dice to a first surface of a substrate array;
mounting a plurality of die adapters to said semiconductor dice such that each one of said die adapters is mounted to a corresponding one of said semiconductor dice;
wire bonding said semiconductor dice to ones of conductive traces of said substrate array;
mounting a collapsible spacer array to one of a heat spreader array and said substrate array;
placing one of said heat spreader array and said substrate array in a mold cavity;
releasably clamping the other of said heat spreader array and said substrate array to a

first die of said mold such that said collapsible spacer array is disposed between said heat spreader array and said substrate array;

molding a molding compound in the mold, thereby molding the semiconductor dice, said substrate array, said wire bonds, said die adapters, said collapsible spacer array and said heat spreader array into the molding compound to provide an array of molded packages;

forming a plurality of ball grid arrays on a second surface of said substrate array, bumps of said ball grid arrays being electrically connected to said conductive traces; and

singulating each integrated circuit package from said array of molded packages.

14. The process according to claim 13, wherein said placing one of said heat spreader array and said substrate array in a mold cavity comprises placing said heat spreader array in said mold cavity such that said heat spreader array rests on a lower die of said mold.

15. The process according to claim 14, wherein said releasably clamping comprises releasably clamping said substrate array to an upper die of said mold.

16. The process according to claim 13, wherein said placing one of said heat spreader array and said substrate array in a mold cavity comprises placing said substrate array in said mold cavity such that said substrate array rests on a lower die of said mold.

17. The process according to claim 16, wherein said releasably clamping, comprises releasably clamping said heat spreader array to an upper die of said mold.

18. The process according to claim 13, wherein said wire bonding further comprises ground wire bonding each of said die adapters to said corresponding one of said semiconductor dice.

19. The process according to claim 13, wherein wire bonding further comprises ground wire bonding each of said semiconductor dice to a corresponding ground pad on said substrate array.

20. The process according to claim 13, wherein said mounting said collapsible spacer array comprises mounting said collapsible spacer array to said substrate array.

21. The process according to claim 13, wherein said mounting said collapsible spacer array comprises mounting said collapsible spacer array to said heat spreader array.

22. The process according to claim 19, wherein mounting said collapsible spacer array further comprises mounting a corresponding collapsible spacer of said collapsible spacer array to each of said plurality of die adapters.

23. The process according to claim 22, wherein said collapsible spacer array is disposed between and in contact with said heat spreader during molding.

24. An integrated circuit package comprising:
a substrate having a plurality of conductive traces;
a semiconductor die mounted on a first surface of said substrate;
a die adapter to said semiconductor die;
a plurality of wire bonds between said semiconductor die and ones of said conductive traces;
a heat spreader disposed proximal to and spaced from said die adapter by at least one collapsible spacer;
a molding compound encapsulating the semiconductor die, the wire bonds, the die adapter and said collapsible spacer between the substrate and the heat spreader; and
a ball grid array on a second surface of said substrate, bumps of said ball grid array being electrically connected to said conductive traces.

25. The integrated circuit package according to claim 24, wherein said at least one collapsible spacer comprises a collapsible spacer disposed between and in contact with said heat spreader and said die adapter.

26. The integrated circuit package according to claim 24, wherein said at least one collapsible spacer further comprises a plurality of collapsible spacers disposed between and in contact with said heat spreader and said substrate array.

27. The integrated circuit package according to claim 24, wherein wire bonding further

comprises ground wire bonding said semiconductor die to said die adapter.

28. The integrated circuit package according to claim 24, wherein wire bonding further comprises ground wire bonding said semiconductor die to at least one ground pad on said substrate.

29. An integrated circuit package manufactured by the process of claim 1.